

6. ACCIDENT PREVENTION PROGRAM

The OU 7-13/14 integrated probing project activities present numerous potential chemical, radiological, and physical hazards to personnel conducting the required tasks. It is critical that all personnel understand and follow the task-specific requirements of this HASP. Engineering controls, hazard isolation, specialized work practices, and the use of PPE will all be implemented to eliminate or mitigate all potential hazards and exposures. However, every person on the project site must play their role in the identification and control of hazards.

6.1 Voluntary Protection Program and Integrated Safety Management

The INEEL safety processes embrace the Voluntary Protection Program (VPP) and Integrated Safety Management System (ISMS) criteria, principles, and concepts as part of operational excellence. All levels of management are responsible to implement safety policies and programs and to maintain a safe and healthy work environment. Project personnel are expected to take a proactive role to prevent accidents, ensure safe working conditions for themselves and fellow personnel, and comply with all work control documents and procedures.

The **ISMS** is focused on the **system** side of conducting operations and **VPP** concentrates on the **people** side of conducting work, but both define work scope, identify and analyze hazards, and mitigate the hazards. The VPP is a process that promotes and encourages continuous safety improvement but is not a requirement of any regulatory agency. The INEEL and affected subcontractors participate in VPP and ISMS for the safety of their employees. Additional information regarding INEEL VPP and ISMS programs can be found in PDD-1005, Site Operations. The five key elements of VPP and ISMS are listed below.

Voluntary Protection Program

Management leadership
Employee involvement
Work site analysis
Hazard prevention and control
Safety and health training

Integrated Safety Management System

Define work scope
Analyze hazards
Develop/implement controls
Perform work within controls
Provide feedback and improvement

6.2 General Safe-Work Practices

The following procedures are mandatory for all INEEL and subcontractor personnel working on the OU 7-13/14 project site. All site visitors entering the task site area (SZ and beyond) must follow these procedures. **Failure to follow these practices may result in permanent removal from the OU 7-13/14 project site and other disciplinary actions.** The FTL and HSO are responsible to ensure these hazard control practices are followed at the OU 7-13/14 project site:

- Limit access to authorized INEEL, subcontractor, and visitor personnel only.
- All personnel have the authority to initiate **STOP WORK** actions, using MCP-553, "Stop Work/Shut Down Action."

- Absolutely no eating, drinking, chewing gum or tobacco, smoking, applying cosmetics, or any other practice that increases the probability of hand-to-mouth transfer and ingestion of materials shall be allowed, except in designated areas.
- Be aware of and comply with all safety signs, color codes, and barriers. Adhere to MCP-27 **14**, “Safety Signs, Color Codes, and Barriers.”
- Be alert for dangerous situations, strong or irritating odors, airborne dusts or vapors, and broken containers. Report all potentially dangerous situations to the FTL or HSO.
- Avoid direct contact with potentially contaminated substances. Do not walk through spills or other areas of contamination. Avoid kneeling, leaning, or sitting on equipment or ground that may be contaminated.
- Be familiar with the physical characteristics of the task site, including, but not limited to:
 - Wind direction
 - Accessibility of fellow personnel, equipment, and vehicles
 - Communications at the task site and with RWMC **SS**
 - Areas of known or suspected contamination at the SDA
 - Major roads and means of access to and from the SDA
 - Nearest water sources and fire-fighting equipment
 - RWMC project warning devices and alarms
 - Capabilities and location of RWMC incident response team and INEEL fire department.
- Report all broken skin or open wounds to the **HSO** or FTL. The OMP physician will consider how the wound can be bandaged and will recommend PPE to be worn by the injured employee. The RWMC RadCon supervisor or designee will determine if the wound presents a significant risk of internal radiological exposure. Personnel with unprotected wounds shall not be permitted to enter the EZ.
- Prevent releases of hazardous materials, including those used at the task site. If a spill occurs, try to isolate the source (if possible, and if this does not create a greater exposure potential); then report it to the FTL or HSO. The RWMC shift supervisor will be notified and additional actions taken as described in Subsection **11.1.4** of this HASP. Appropriate spill response kits, or other confinement and absorbent materials, will be maintained at the task site.
- Avoid unnecessary and excessive movement during decontamination (if required).
- Project personnel will ensure that electrical equipment, wiring, cables, switches, and current overload protection meet applicable regulations and are maintained in a manner that provides protection for project personnel from shock hazards, injury, and prevents property

damage, in accordance with MCP-3650, “Chapter IX Level I Lockouts and Tagouts,” MCP-3651, “Chapter IX Level II Lockout and Tagouts,” and RWMC supplements. Ground-fault protection will be provided whenever electrical equipment is used outdoors.

- Keep all ignition sources at least 15 m (50 ft) from explosive or flammable environments and use non-sparking, explosion-proof equipment (if advised to do so by a safety professional).
- Personnel working in the exclusion or controlled access zone shall implement the “buddy system” (see Subsection 6.5 of this HASP).
- Personnel who wear contact lenses shall comply with MCP-2716, “Personal Protective Equipment.”

6.3 As Low as Reasonably Achievable Principles

Radiation exposure of OU 7-13/14 integrated probing project personnel shall be controlled such that radiation exposures are well below regulatory limits, and that there is no radiation exposure without commensurate benefit. Unplanned and preventable exposures are considered unacceptable. All project tasks will be evaluated with the goal to eliminate or minimize exposures. Following ALARA principles and practices is the responsibility of all project personnel. All personnel working at OU 7-13/14 project sites must strive to keep both external and internal radiation doses ALARA by adopting the following practices. The Type-B probe installation, sampling, and logging tasks will be the primary focus for contamination control and for applying engineering controls to reduce radiation exposure.

6.3.1 External Radiation Dose Reduction

Sources for external radiation exposure at the OU 7-13/14 project site include waste in Pits 4, 9, and 10, logging tool sources (isotopic and neutron generators), potential “shine” from open probes, adjacent pits or trenches, and samples brought to the surface. Basic protective measures used to reduce external doses include minimizing time in radiation areas, maximizing the distance from the source of radiation, and using shielding whenever possible. The following are methods to minimize external doses:

Methods to Minimize Time

- Use mock-ups and practice runs that will duplicate OU 7-13/14 integrated probing, logging, and sampling activities
- Plan and discuss the tasks prior to entering designated radiation areas (including having all equipment and tools prepared)
- Perform as much work as possible outside radiation areas and take advantage of lower dose rate areas (as shown on the radiological survey maps) or away from logging tool
- Take the most direct route to the task site and work efficiently
- If problems occur in the radiation areas, hold technical discussions outside radiation area, then return to the work area to complete the task
- If stay times are required, know your stay time and use appropriate signal and communication method to let others in the area know when the stay time is up

- Respond to all alarming electronic dosimetry or instrumentation
- Know your current dose and your dose limit. DO NOT EXCEED YOUR DOSE LIMIT.

Methods to Maximize Distance from Sources of Radiation

- Wear alarming electronic dosimetry as stated on the RWP
- Comply with RCT survey hold points identified in OU 7-13/14 procedures and RWP prior to entering areas where potential sources of contamination may exist
- Operational drill rig from control trailer and unsheltered field crew shall observe minimum distance requirements established in procedures
- Follow administrative/procedural controls for drilling and sampling operations and downhole logging, and use the provided extension tool for placement of the sealed source in the activated logging tool
- Stay as far away from the source of radiation as possible (extremely important for point sources where, in general, if the distance between the source is doubled, the dose rate falls to one-fourth the original dose rate)
- Be familiar with the RWP expected dose rates in OU 7-13/14 project areas and limiting conditions with respect to dose limits.

Proper Use of Shielding

- Take advantage of the site equipment and enclosures to shield yourself from radiation sources
- Keep the logging sealed source in a secure, shielded configuration (storage cask or logging tool) when not in use
- Ensure interlocks are operational on neutron generating device and tool is only activated when lowered below ground surface
- Wear safety glasses to protect eyes from beta radiation
- Conduct Type B sampling tasks inside designated glove-bag confinement
- Verify integrity of all confinements prior to initiating potential radioactive sample material-handling operations.

6.3.2 Internal Radiation Dose Reduction

An internal radiation dose potential exists at the OU 7-13/14 integrated probing project site from radiological contamination present in the pits. Sources include pit waste content (e.g., sludges and debris, waste containers) and contaminated soils surrounding breached containers. The clean overburden layer over the waste seam provides a protective layer and all Type-B probes are designed with sealing surfaces to prevent contaminant migration to the surface (other than in designated sampling ports).

Therefore, potential migration is not anticipated. Probe installation and sampling of Type-B probes present the greatest potential for encountering radiological contamination.

An internal dose is a result of radioactive material being taken into the body. Radioactive material can enter the body through inhalation, ingestion, absorption through wounds, or injection from a puncture wound. Reducing the potential for radioactive material to enter the body is critical to avoid internal dose. The following are methods to minimize internal radiation dose:

- Know the OU 7-13/14 integrated probing project potential sources for encountering contamination and utilize all engineering controls
- Inspect glove-bag enclosure prior to use in accordance with MCP-199, “Total Containment Glove Bags and Glove Boxes”
- Utilize HEPA-filtered glove bag for all vapor and water sampling tasks
- Conduct a whole body personal survey as required by RWP, then proceed directly to the personal contamination monitor (PCM)
- Report all wounds or cuts (including scratches and scrapes) before entering radiological controlled areas
- Wash hands, arms, face, and any other exposed skin before eating, drinking, smoking, or participating in other activities that may provide a pathway for contaminants.

6.4 Nonradiological Contaminant Exposure Avoidance

The waste in Pits 4, 9, and 10 are “mixed” waste containing both radiological and nonradiological (organic and inorganic chemicals and hazardous materials) constituents. Table 8-3 in Section 8 of this HASP lists the dominant nonradiological contaminants to be encountered by the integrated probing of Pits 4, 9, 10 (and 6, if investigated). The same potential exposure pathways that exist for radiological Contamination apply equally to these nonradiological contaminants. Each contaminant has distinct physical, chemical, and mechanical properties that determine its toxicity.

Threshold limit values (TLVs) have been established to provide guidelines to evaluate airborne and skin exposure to these chemicals and materials. They represent levels and conditions under which it is believed that nearly all workers may be exposed, day after day, without adverse health effects. Based on these TLVs, specific action limits have been established (see Table 8-7) to further limit the potential for approaching these contaminant TLVs.

The same engineering controls employed to eliminate or mitigate airborne radioactivity (HEPA-filtered glove bags for sampling) will serve to control nonradiological airborne contaminants. Every effort will be made to isolate the source of these hazards through engineering controls and confinement, where feasible. Some of these contaminants pose other exposure hazards from contact and skin absorption and the implementation of barriers will serve to minimize the potential for exposures. Methods of exposure avoidance at OU 7-13/14 integrated probing project sites include the following:

- Collecting Type B samples directly in HEPA-filtered to isolate the source of contamination
- Wear all required PPE, inspect all pieces before donning, tape all seams

- Ensure all water sample containers are securely closed prior to transport
- Perform required radiological surveys as directed by the task RWP (detectable radiological contamination may be indication of the presence of nonradiological contaminants)
- Wash hands, arms, face, and any other exposed skin before eating, drinking, smoking, or participating in other activities that may provide a pathway for contaminants.

6.5 The Buddy System

The “buddy system” will be used at OU 7-13/14 integrated probing project sites when personnel are in the EZ while actively operating (e.g., installing probes, logging, sampling). The buddy system requires workers to assess and monitor their buddy’s mental and physical well being during the course of the workday. Buddies must be able to perform the following:

- Provide assistance
- Verify the integrity of PPE
- Observe their partner for signs and symptoms of heat stress, cold stress, or contaminant exposure
- Notify other personnel in the EZ if emergency assistance is needed.

Workers need to be able to see or hear and effectively communicate with their buddy at all times. Task-site personnel will continually check their “buddy” while work is being performed.

7. SITE CONTROL AND SECURITY

Based on the potential to encounter radiological and chemical contamination when conducting OU 7-13/14 integrated probing project tasks, formal work zones and radiological areas will be established for all tasks within the **SDA** sites. Project tasks conducted at the Cold Test Pit South (CTP-S) will be conducted in designated work areas, construction area, or may utilize training-use-only radiological areas or HAZWOPER zones for readiness assessments.

Entry into and exit out of task-site work zones will be controlled through the appropriate use of barriers, signs, and other measures that are described in this section and MCP-2714, "Safety Signs, Color Codes, and Barriers," defines the general requirements. Personnel not directly involved with OU 7-13/14 integrated probing activities shall be excluded from entering designated work zones. Nonfield team members, such as inspectors, may be admitted to OU 7-13/14 task sites, provided they are on official business, authorized by the HSO, and have met all the training requirements for the area they wish to access, in accordance with Section 4 of this HASP.

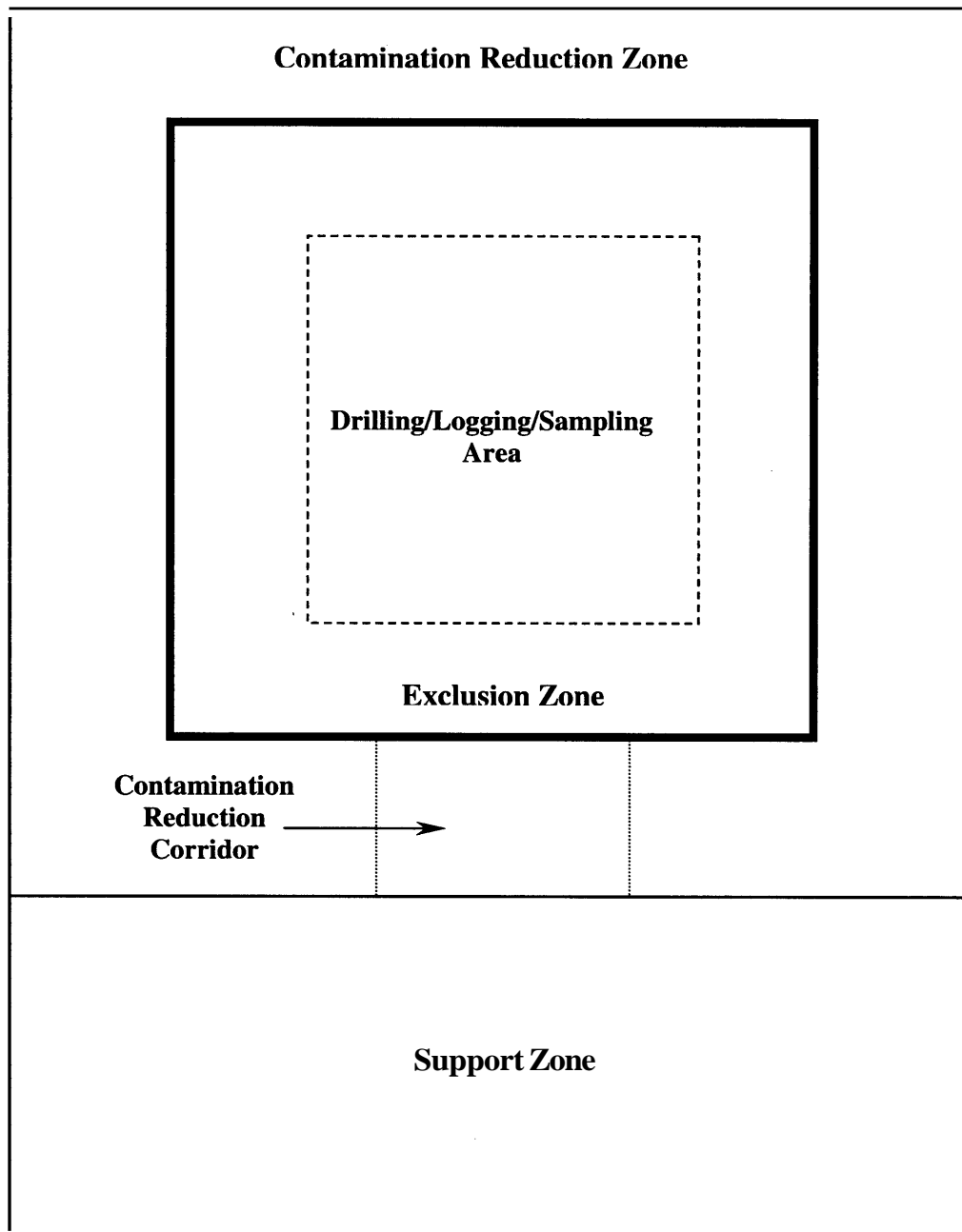
Note: Visitors may not be allowed beyond the **SZ** during certain OU 7-13/14 project tasks (e.g., probehole installation, drill rig movement, sampling, and others, as determined by the HSO) to minimize safety or health hazards or as an ALARA consideration. The determination as to any visitor's "need" for access beyond the **SZ** at the OU 7-13/14 project site will be made by the HSO in consultation with RWMC RadCon personnel.

Both radiological and nonradiological hazards (including industrial safety hazards) will be evaluated when establishing the initial work zone size and location. Common barriers may be used to delineate both radiological and nonradiological work-zone postings, depending on the nature and extent of contamination. If common barriers are used, they will be delineated and posted according to both sets of requirements (29 CFR 1910.120 and 10 CFR 835), using appropriate colored rope and postings.

Work zones may include the following:

- Exclusion zone
- Contamination reduction zone (CRZ), including a contamination reduction corridor (CRC) (the CRC may not be posted, but is the primary pathway from the CRZ to the EZ)
- Support zone.

Figure 7-1 illustrates an example work zone that will be established for each OU 7-13/14 task site (i.e., Pits 4, 9, and 10). Figure 7-2 illustrates a generalized configuration for CTP-designated work areas. These figures represent the general configuration of an OU 7-13/14 work zones and is not meant to provide an exact layout or configuration of all equipment or zone sizes. Several factors may result in changing cause-zone configurations, size, and location. These include (1) the pit being investigated, (2) project tasks being conducted, site monitoring data, and changing wind direction. Additionally, entrances and egress points may change, based on these same factors. Changes in zone configuration and size will be the decision of the HSO in conjunction with the IH, RE, RCT, and FTL (as appropriate).



Not to scale

General work zones for the Operable Unit 7-13/14 integrated probing project site in Subsurface Disposal Area.

Figure 7-1. General work zones.

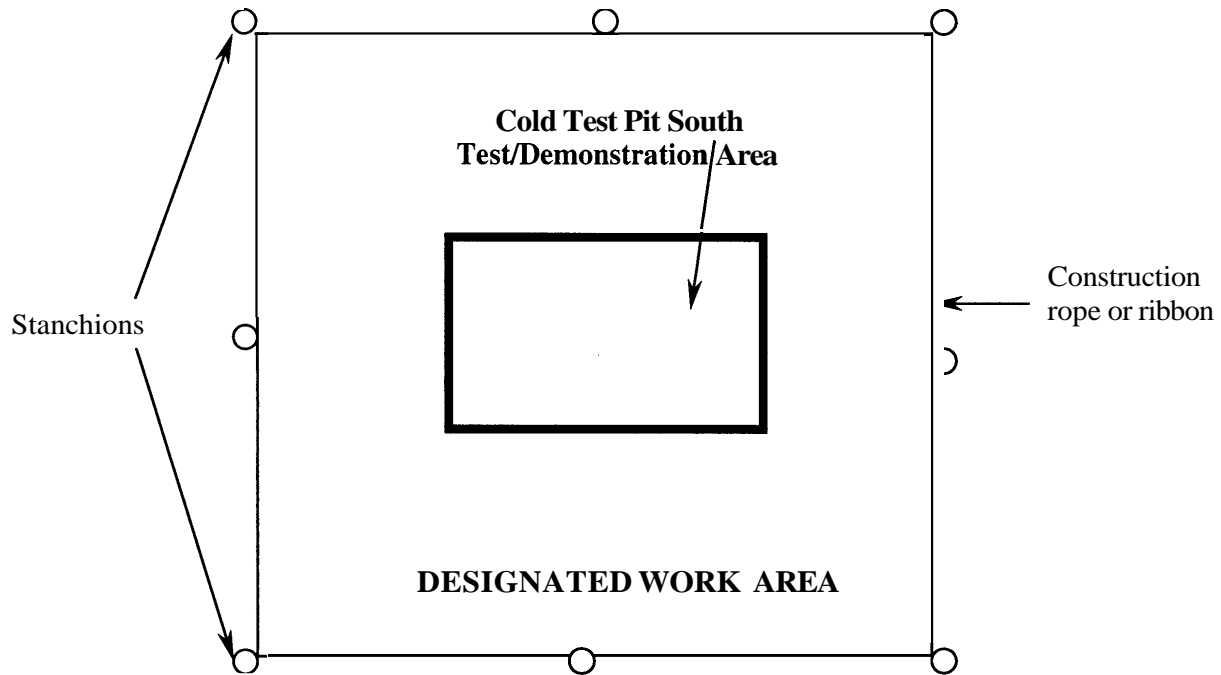


Figure 7-2. General work zones for the Operable Unit 7-13/14 integrated probing project site at Cold Test Pit-South.

The MCP-187, “Posting Radiological Control Areas,” shall be used to post and control access to radiologically controlled areas at the OU 7-13/14 integrated probing project site. Radiation control personnel at OU 7-13/14 integrated probing project sites will establish radiologically controlled areas as required. These may include the following:

- Radiological buffer area (**RBA**) (which is the entire **SDA**)
- Radiation area (if required area around logging source or neutron generator)
- High radiation area (if required, resulting from dose rate from logging source)
- Radioactive material area
- Underground radioactive material area (Pit areas)
- Radiological control trailer (CRC/SZ line) with a PCM.

7.1 Exclusion Zone

The EZ will be large enough to encompass the primary task area (e.g., drilling, logging, sampling) and to allow equipment and personnel to move about freely and conduct necessary material handling tasks. The minimum number of personnel required to safely perform the OU 7-13/14 integrated probing project tasks will be allowed into the EZ. Since the drill rig and sampling glove bag will be moving

between probehole locations, the EZ will be moved or reconfigured to encompass an area large enough to prevent non-field team personnel in the SZ from being exposed to potential safety and health hazards. The EZ shape and size will be based on the specific area being worked in.

The EZ is a controlled access zone at all times. An entry and exit point will be established at the periphery of the EZ/CRC to regulate the flow of personnel and equipment. The EZ boundary will be delineated with rope or printed hazard ribbon and posted with signs. Factors that will be considered when establishing the EZ boundary include (1) tasks being conducted, (2) air monitoring data, (3) radiological (4) contamination data, (5) radiation fields, (6) equipment in use, (7) the physical area necessary to conduct site operations, and (8) the potential for contaminants to be blown from the area. The boundary may be expanded or contracted, as this information becomes available. All personnel who enter the EZ will wear the appropriate level of PPE for the degree and type of hazards present, as listed in Section 9 of this HASP.

Type B sampling tasks (water and vapor) will be conducted inside a glove bag equipped with a HEPA filter. The glove bag will be constructed, tested, and operated in accordance with MCP-199. Samples and other materials inside the glove bag will not be released until required radiological surveys have been completed (e.g., hand-held instruments and swipes) in accordance with MCP-139, "Radiological Surveys," MCP-425, "Surveys of Materials for Unrestricted Release and Control of Movement of Contaminated Material," and as directed by the RWP.

7.2 Contamination Reduction Zone and Corridor

The CRZ and CRC for the OU 7-13/14 integrated probing project are transition areas surrounding the EZ, and are located between the EZ and SZ (see Figure 7-1). The CRZ will not be formally delineated, but will be designated by the travel path from the established CRZ-controlled entry and exit point and the EZ entry and exit point. The CRZ and CRC will serve to buffer and further reduce the probability of the SZ becoming contaminated. The CRC will encompass an area large enough to allow for equipment and personnel to travel through. All project personnel and equipment (except for the drill rig) entering and exiting the EZ will transition through the CRC. Restricting traffic to these controlled areas will minimize physical transfer of contaminating substances on personnel, equipment, or in the air. The CRZ and CRC may serve as staging areas for equipment and temporary rest areas for personnel. Because of the potential for contamination (migration from airborne contamination in the EZ), PPE and sample packaging and preparation equipment will be stored in the **SZ**.

If radiological or mixed contamination (nonradiological or radiological) is found, work will stop until a new RWP is written; then radiological decontamination techniques will be used (as described in Section 10.2.2 of this HASP). One of the radiological decontamination goals is not to generate any free liquid. Shielding problems (alpha contamination shielded by water) will be minimized by use of dry-decontamination techniques (e.g., HEPA vacuum and adhesive tape) and avoiding wet methods. If necessary, wet methods will be used. All containerized decontamination waste will be staged in the CRZ.

A nonradiological decontamination pad may be established if it is believed that residual nonradiological contamination is present on equipment following radiological free release. The OU 7-13/14 integrated probing project **IH** will be responsible for nonradiological contamination issues and determining the most appropriate decontamination methods, as described in Section 10.2.2 of this HASP. A designated portion of the CRC, or other area, will be established for the nonradiological decontamination of equipment (if required). All decontamination supplies (e.g., nonradiological decontamination solution and wipes), used nonradiological PPE, and debris waste containers may be located in the CRC.

7.3 Support Zone

The SZ will be considered a radiological and nonradiological “clean” area. The location of the SZ will be in a prevailing upwind direction to the EZ (where possible) and readily accessible to the nearest road. The SZ is an area outside the CRZ. This area will not be delineated since the SDA is a controlled area requiring specific RWMC training for entry. Support trailers (control trailer and RadCon trailers), vehicle parking, additional emergency equipment, extra PPE, and stored monitoring and sampling equipment may be located in the SZ. Visitors who do not have appropriate training to enter other project areas will be restricted to this zone.

Operable unit 7-13/14 integrated probing project site work zones and radiologically controlled areas will be maintained during off-hours and weekends by personnel ensuring they are in good condition prior to exiting the project site for the day. These zones and areas will remain intact until all site tasks have been completed and equipment and supplies have been decontaminated and removed from the project site. The HSO and RCT will ensure that site zones are posted and intact when leaving the site, and will be responsible to break down the zones when site activities have been completed.

Note: Only RadCon personnel can post and remove radiological postings and raise and lower radiological barriers. This will be accomplished in accordance with the Manual 15A, *Radiation Protection-INEEL Radiological Control Manual* and MCP-187, “Posting Radiological Control Areas.”

7.4 Designated Work Areas

Operable Unit 7-13/14 integrated probing project activities at the CTP will require designated work areas to be established to prevent non-field-team-member personnel from being exposed to safety and equipment hazards. The designated work area will be delineated with rope or other barriers and posted to alert non-field-team members of the area. A designated work area or construction area will be delineated for all drilling, logging or sampling operations at the CTP established for test or training purposes. “Training use only” radiological areas or HAZWOPER zones may be established in conjunction with the designated work area for mock-ups or readiness assessments. Only trained field team members will be allowed in the designated work area.

7.5 Designated Eating and Smoking Area

Ingestion of hazardous substances is likely when workers do not practice good personal hygiene habits. It is important to wash hands, face, and other exposed skin thoroughly after completion of work and before smoking, eating, drinking, and chewing gum or tobacco. **No smoking, chewing, eating, drinking, applying lip balm, and so forth, is allowed within the OU 7-13/14 site work zones.** When required by the RWP, all personnel will complete the required radiological survey with hand-held instruments. Additionally, personnel will complete an automated, whole-body survey at the PCM station, or equivalent survey method (as determined by RadCon), as stated in the RWP. As a minimum, all personnel should wash their hands prior to using designated eating or smoking areas.

The designated eating areas for the OU 7-13/14 task-site personnel will be the RWMC WMF-657, the RWMC cafeteria, CTP trailer, other RWMC designated eating areas outside the SDA or outside the RWMC (e.g., Central Facilities Area [CFA] cafeteria).

Personnel will not be permitted to smoke in the RWMC SDA. Project personnel will use only approved RWMC facility or CTP smoking areas or smoking areas located outside the RWMC.

All personnel will comply with INEEL smoking policies, including disposing of smoking materials in the proper receptacle.

